

REMARKS

Reconsideration of the present application is respectfully requested in view of the following remarks. Prior to entry of this response, Claims 1-6 were pending in the application, of which Claims 1 and 4 are independent. In the Office Action dated November 20, 2002, Claims 1-6 were rejected under 35 U.S.C. §103(a), and both the specification and the drawings were objected to. Following this response, Claims 1-6 remain in this application. Applicant hereby addresses the Examiner's rejections in turn.

I. Objection to the Specification

In the Office Action dated November 20, 2002, the Examiner objected to the specification because of informalities. The specification has been amended, and Applicant respectfully submits that the amendment overcomes this objection and adds no new matter.

II. Objection to the Drawings

In the Office Action, the Examiner objected to the drawings stating that FIG. 1 and FIG. 3 are identical. Applicant respectfully traverses this objection.

Though the basic structure of the FIG. 1 ion source embodiment is similar to the conventional device shown in FIG. 3, the device of FIG. 3 at least is not set up to satisfy $L < 3.37B^{-1}\sqrt{(V_A) \times 10^{-6}}$. (See page 7, lines 12-23 of the specification.) At least for this reason, FIG. 1 and FIG. 3 are not identical as suggested by the Examiner. Accordingly, Applicant respectfully requests withdrawal of this objection to the drawings.

III. Rejection of the Claims Under 35 U.S.C. § 103(a)

In the Office Action, the Examiner rejected Claims 1-6 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,554,852 ("*Bright*") in view of U.S. Patent No. 6,037,717 ("*Maishev*"). Applicant respectfully traverses this rejection.

Claim 1 is patentably distinguishable over the cited art in that it recites, for example, an ion source comprising a plasma production vessel which serves as an anode, a filament provided on one side of said plasma production vessel, a reflector provided opposite said filament on the other side of said plasma production vessel and kept at a filament potential or a floating potential, and a magnet for generating a magnetic field in a direction of connecting said filament and said reflector within said plasma production vessel, wherein a relation $L < 3.37B^{-1}\sqrt{(V_A)} \times 10^{-6}$ is satisfied, where the arc voltage applied between said plasma production vessel and said filament is $V_A[V]$, the magnetic flux density of the magnetic field within said plasma production vessel is $B[T]$, and the shortest distance from a most frequent electron emission point located almost at the tip center of said filament to a wall face of the plasma production vessel is $L[m]$.

Moreover, Claim 4 is patentably distinguishable over the cited art in that it recites, for example, a method for operating an ion source which comprises a plasma production vessel serving as an anode, a filament provided on one side of said plasma production vessel, a reflector provided opposite said filament on the other side of said plasma production vessel and kept at a filament potential or a floating potential, and a magnet for generating a magnetic field in a direction of connecting said filament and said reflector within said plasma production vessel, the method comprising a step of

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leading out an ion beam with the following relation being satisfied, $L < 3.37B^{-1}\sqrt{(V_A)} \times 10^{-6}$ where an arc voltage applied between said plasma production vessel and said filament is $V_A[V]$, a magnetic flux density of the magnetic field within said plasma production vessel is $B[T]$, and a shortest distance from a most frequent electron emission point located almost at the tip center of said filament to a wall face of said plasma production vessel is $L[m]$.

In contrast, *Maishev* at least does not teach or suggest, for example, a magnet for generating a magnetic field in a direction of connecting said filament and said reflector within said plasma production vessel, wherein a relation $L < 3.37B^{-1}\sqrt{(V_A)} \times 10^{-6}$ is satisfied, where the arc voltage applied between said plasma production vessel and said filament is $V_A[V]$, the magnetic flux density of the magnetic field within said plasma production vessel is $B[T]$, and the shortest distance from a most frequent electron emission point located almost at the tip center of said filament to a wall face of the plasma production vessel is $L[m]$, as recited in Claim 1. Nor does *Maishev* teach or suggest, for example, leading out an ion beam with the following relation being satisfied, $L < 3.37B^{-1}\sqrt{(V_A)} \times 10^{-6}$ where an arc voltage applied between said plasma production vessel and said filament is $V_A[V]$, a magnetic flux density of the magnetic field within said plasma production vessel is $B[T]$, and a shortest distance from a most frequent electron emission point located almost at the tip center of said filament to a wall face of said plasma production vessel is $L[m]$, as recited in Claim 4. *Maishev* at least does not teach or suggest satisfying the relation $L < 3.37B^{-1}\sqrt{(V_A)} \times 10^{-6}$, rather, *Maishev* merely discloses the observation that electrons held in cross electric and magnetic fields of such a magnitude at which the Larmor radius of an electron (r_e) is approximately equal

to an anode-cathode distance (d), whereas the Larmor radius of an ion (r_i) significantly exceeds distance "d". (See *Maishev*, column 6, line 67 through column 7, line 3.)

Furthermore, *Bright* does not overcome *Maishev*'s deficiencies. *Bright* merely relates to apparatus for ion implanting pre-selected ions into a target having improved ion source lifetime and reduced ion beam contamination. Like *Maishev*, *Bright* at least does not teach or suggest, for example, a magnet for generating a magnetic field in a direction of connecting said filament and said reflector within said plasma production vessel, wherein a relation $L < 3.37B^{-1}\sqrt{(V_A) \times 10^{-6}}$ is satisfied, where the arc voltage applied between said plasma production vessel and said filament is $V_A[V]$, the magnetic flux density of the magnetic field within said plasma production vessel is $B[T]$, and the shortest distance from a most frequent electron emission point located almost at the tip center of said filament to a wall face of the plasma production vessel is $L[m]$, as recited in Claim 1. Nor does *Bright* teach or suggest, for example, leading out an ion beam with the following relation being satisfied, $L < 3.37B^{-1}\sqrt{(V_A) \times 10^{-6}}$ where an arc voltage applied between said plasma production vessel and said filament is $V_A[V]$, a magnetic flux density of the magnetic field within said plasma production vessel is $B[T]$, and a shortest distance from a most frequent electron emission point located almost at the tip center of said filament to a wall face of said plasma production vessel is $L[m]$, as recited in Claim 4.

Combining *Maishev* with *Bright* would not have led to the claimed invention because *Maishev* and *Bright*, neither individually nor in combination, at least disclose or suggest the aforementioned recitations of Claims 1 and 4. Accordingly, independent

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Claims 1 and 4 patentably distinguish the present invention over the cited art, and Applicant respectfully requests withdrawal of this rejection of Claims 1 and 4.

Dependent Claims 2-3 and 5-6 are also allowable at least for the reasons above regarding independent Claims 1 and 4, and by virtue of their respective dependency upon independent Claims 1 and 4. Accordingly, Applicant respectfully requests withdrawal of this rejection of dependent Claims 2-3 and 5-6.

IV. Conclusion

In view of the foregoing remarks, Applicant respectfully requests the reconsideration and reexamination of this application and the timely allowance of the pending claims. The preceding arguments are based only on the arguments in the Office Action, and therefore do not address patentable aspects of the invention that were not addressed by the Examiner in the Office Action. The claims may include other elements that are not shown, taught, or suggested by the cited art. Accordingly, the preceding argument in favor of patentability is advanced without prejudice to other bases of patentability.

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Respectfully submitted,

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APPENDIX

IN THE SPECIFICATION:

Please replace the paragraph that begins on line 1 of page 4 and ends on line 5 of page 4 with the following paragraph.

As shown in FIG. 1, an [An] ion beam 16 led out of the ion source contains a molecular ion (e.g., P_2^+ , As_2^+), which is an ion like a molecule, besides a monatomic ion (e.g., P^+ , As^+). The molecular ions include, for example, a diatomic ion composed of two atoms, and a triatomic ion composed of three atoms.

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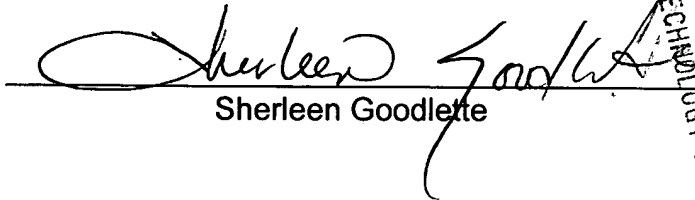
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1. Amendment with Appendix (8 pgs)
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